REMARKS

In the Office Action mailed on September 2, 2003, the Examiner rejected claims 7-9, 11-13, and 15-18 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Applicant's admitted prior art (AAPA) in view of Miki et al. (U.S. Pat. No. 5,499,207) ("Miki"), and Possin et al. (U.S. Pat. No. 5,777,355) ("Possin"). The Examiner rejected claims 10, 14, and 19 over Applicants' description, Miki, Possin, and further in view of one of ordinary skill in the art.

The Examiner admits that the AAPA fails to disclose a second passivation layer that reduces lateral leakage current. *See,* Office Action, page 2. The Examiner relies on Miki to cure this deficiency. Although Miki discloses a TiO_2 layer formed on a glass layer (*see*, Miki, Figs. 5(a) through 5(f) and discussion, col. 4, line 55, through col. 5, line 65), Miki does not teach "depositing a second passivation layer that suppresses lateral leakage current," as is recited in claims 7 and 11, or "depositing a continuous layer of i a-Si disposed on the second passivation layer," as is recited in claims 7 and 11, or "depositing sensor material comprising a continuous layer of i a-Si over the collection electrode and at least a portion of the second passivation layer" as is recited in claim 16.

As described in Miki, with reference to Figures 5(a) through 5(f) of Miki and Figure 6, and as described in col. 4, line 55, through line 6, col. 45, a thin layer of TiO_2 is deposited over a phosphorus glass layer. Holes for conductor plugs are etched so that contacts can be made from the lower capacitor electrode to devices in the underlying device layer. Conductor plugs are formed in the holes and platinum electrodes are formed over the plugs. A high-dielectric constant layer is formed from PZT over the entire structure and a second electrode is then deposited.

Miki teaches that the increased insulation between capacitors in the array is not due to the thin TiO_2 layer that was deposited, but is a result of specific materials interactions between the

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TiO_2 layer and the subsequently deposited high-dielectric insulation layer and the upper electrode layer. In particular, Miki explains that

> [t]he high-dielectric constant insulator deposited over the structure of FIG. 1 has a stoichiometric composition over the platinum and has a titanium-rich composition over the trench bottom. The non-stoichiometric composition layer over the bottom, which is formed by reaction between the titanium oxide in the thin layer and lead in the high dielectric constant material, has a low dielectric constant and a high degree of insulation so that AC and DC electric insulation is effectively maintained between the adjacent electrodes. Because of a low crystallinity, moreover, the layer formed has a planarized morphology.

(Miki, col. 3, lines 9-19.) Further, Figure 7 of Miki illustrates the results of not utilizing the TiO_2 layer:

> Specifically, if the titanium dioxide 103 shown in FIG. 1 is not used, the morphology of the trench portion is deteriorated in the region 701 so that the upper platinum electrode 602 fails to reach the bottom of the trench. As a result, not only the electrostatic capacitance per bit drops to less than 50% of that of the case of the present invention, but also the electric coupling between the adjacent bottom electrodes 104 increases so that the amount of charge to be stored in the adjacent electrodes based on their potential fluctuates greatly. Even worse, the breakdown voltage between the adjacent electrodes may drop, and a leakage current as high as 10^{-6} A/cm^2 may be observed for a potential difference of 2 V.

(Miki, col. 6, lines 50-61.) Additionally, Miki is quite explicit about the combinations of materials that can be utilized in this fashion and, in effect, teaches away from the layer combination (i.e., i a-Si deposited on the second passivation layer) that is claimed in the present application:

> Although foregoing embodiment used platinum as the electrode material, PZT as the high-dielectric-constant dielectric material, and titanium dioxide as the trench bottom material, the present invention can be practiced by changing the materials, as follows. The electrode material can be embodied by a metal such as palladium or nickel, an alloy composed of platinum, palladium or

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> nickel as its main component, an oxide of vanadium, chromium, iron, ruthenium, indium, tin, rhenium, iridium, lead, copper or palladium, and a mixture oxide (including an oxide super conductor) composed of those oxides as its main component. Another example is a nitride of titanium, vanadium, zirconium, niobium, hafnium or tantalum. On the other hand, the high-dielectric-constant material can be effectively embodied by an oxide high-dielectric-constant material, as expressed in the following form: (A1A2 . . .) (B1B2 . . .)O_x (A1, A2 . . . =Ca, Sr, Cd, Ba, Pb, La, Bi, Tl, Na, K; and B1, B2 . . . =Ta, Ti, Zr, Hf, Fe, Nb, Sn, U, Al, Mn, W, Yb, Sc, U, In, Sb, Co, Zn, Li, Mo, Ni, Co), a material composed of these as a main component, or their mixture with another device. The trench bottom material can be embodied by a material composed with its main component of an oxide of the device, as recited by B1, B2, . . . indicated above.

(Miki, col. 6, line 63, to col. 7, line 17.) As opposed to the Examiner's combination of the process steps after deposition of the second passivation layer (see, e.g., page 3), Miki explicitly teaches that it matters a great deal what subsequent materials processing steps occur. Decidedly, the intrinsic amorphous silicon layer deposited on the second passivation layer in Applicants' invention is not one of the combinations mentioned in the teaching of Miki.

Therefore, from the above discussion, Miki does not teach that the TiO_2 deposited layer suppresses lateral leakage current. Further, Miki, in effect, teaches away from deposition of the i a-Si layer on the TiO_2 layer. The intrinsic amorphous silicon layer on a TiO_2 layer is not a combination of materials is not a combination that is identified as beneficial by the teachings of Miki.

Possin et al. fails to address this deficiency. This reference also fails to disclose or suggest a second passivation layer to suppress lateral leakage current and depositing a continuous layer of i a-Si disposed on the second passivation layer. Moreover, Possin et al. does not relate to high fill factor image arrays, but to conventional photosensitive elements.

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Therefore, claims 7, 11, and 16 are allowable over Miki in combination with Applicants' description. Claims 8-10 depend from claim 7 and are allowable for at least the same reasons as is claim 7. Claims 12-15 depend from claim 11 and are allowable for at least the same reasons as is claim 11. Claims 17-19 depend from claim 16 and are allowable for at least the same reasons as is claim 16.

Applicants once again maintain that the Examiner is citing non-analogous art against the claims of the application. The structural and material differences between capacitor device structures and Applicants' full fill-factor imaging arrays are too different to expect one of ordinary skill in the art, even knowing of the teachings of Miki, to look to Miki for processes and structures that relate to a full-fill imaging array. Even assuming, *arguendo*, that such capacitor art as Miki is analogous art, the requisite motivation to combine does not exist. Thusfar, the Examiner has failed to provide a motivation to combine these types of references. As such, Applicants respectfully request that the Examiner provide the requisite objective reasoning for combining the Miki reference with Applicants' description of a conventional full-fill factor imaging array in the fashion suggested by the Examiner. *See, Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).

As was discussed above, Miki teaches deposition of a TiO_2 layer with subsequent definitions of a high dielectric layer over conducting electrodes and a second electrode layer. The interactions between the deposited materials planarizes the depositions of the second electrode and high dielectric layers and improves the electrical isolation between electrodes. One skilled in the art, therefore, would not look to Miki to provide a second passivation layer as is recited in the present application.

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In view of the foregoing remarks, Applicants respectfully request reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

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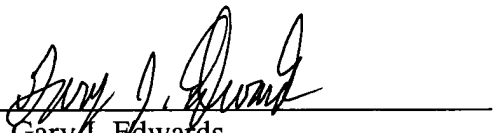
By: 
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